Automotive Brake, Suspension, and Steering Repair I

Course Credit	1.0
Grade Levels	9-12
Prerequisites	Automotive Technology Foundations is required as a prerequisite or a corequisite.

Automotive Brake, Suspension, and Steering Repair I is designed to equip students with foundational knowledge and skills regarding automotive suspension, steering, and brake systems. Strong emphasis is placed on system and component operations. Standards are designed to equip students to diagnose and repair engine performance related systems. This course incorporates personal and environmental safety practices associated with clothing, eye protection, hand tools, power equipment, ventilation, and material and chemical handling. Local, state, and federal safety and environmental regulations will be followed.

Content standards are written to meet Automotive Service Excellence (ASE) Education Foundation requirements, which also specify task lists, program hours, and safety standards.

Career and Technical Student Organizations are integral, co-curricular components of each career and technical education course. These organizations enhance classroom instruction while helping students develop leadership abilities, expand workplace-readiness skills, and access opportunities for personal and professional growth. Students in the Transportation, Distribution and Logistics career cluster affiliate with SkillsUSA.

Foundational standards, shown in the table below, are an important part of every course. Through these standards, students learn and apply safety concepts, explore career opportunities and requirements, practice the skills needed to succeed in the workplace, develop leadership qualities and take advantage of the opportunities afforded by Career and Technical Student Organizations (CTSOs), and learn and practice essential digital literacy skills. The foundational standards are to be incorporated throughout the course.

Each foundational standard completes the stem *"**Students will**..."*

Foundational Standards

1. Incorporate safety procedures in handling, operating, and maintaining tools and machinery; handling materials; utilizing personal protective equipment; maintaining a safe work area; and handling hazardous materials and forces.
2. Demonstrate effective workplace and employability skills, including communication, awareness of diversity, positive work ethic, problem-solving, time management, and teamwork.
3. Explore the range of careers available in the field and investigate their educational requirements, and demonstrate job-seeking skills including resume-writing and interviewing.
4. Advocate and practice safe, legal, responsible, and ethical use of information and technology tools specific to the industry pathway.
5. Participate in a Career and Technical Student Organization (CTSO) to increase knowledge and skills and to enhance leadership and teamwork.
6. Apply literacy, mathematical, and scientific principles and precision measurements when diagnosing problems, making repairs.
7. Work independently, collaboratively, and in teams to explore concerns, find causes, and take appropriate action by applying principles of STEM.

AUTOMOTIVE BRAKE, SUSPENSION, AND STEERING REPAIR CONTENT STANDARDS

Each content standard completes the stem *"**Students will**..."*

Suspension and Steering Systems

1. Disable and enable supplemental restraint system (SRS) and verify indicator lamp operation.
2. Identify and inspect suspension and steering system components and configurations including rack and pinion steering gear, inner tie rod ends (sockets), and bellows boots.
3. Flush, fill, and bleed power steering system using proper fluid type per manufacturer specification.
4. Remove, inspect, replace, and adjust power steering pump drive belt, power steering hoses, and fittings.
5. Inspect steering components including pitman arm, relay (center link and intermediate) rod, idler arm, mountings, steering linkage damper, tie rod ends (sockets), tie rod sleeves, clamps, power steering fluid level and condition, and inspect for fluid leakage.
6. Inspect upper and lower control arms shafts, rebound bumpers, track bar, strut rods and radius arms, upper and lower ball joints (with or without wear indicators), suspension system coil springs, spring insulators (silencers), torsion bars, and related mounts and bushings.
7. Perform front and rear suspension system maintenance and repair including struts, shocks, sway bars, and all bushings.
8. Inspect rear suspension system lateral links and arms (track bars), control (trailing) arms, leaf spring(s), spring insulators (silencers), shackles, brackets, bushings, center pins and bolts, and mounts.
9. Identify hybrid vehicle power steering system electrical circuits and safety precautions, and inspect electric power steering assist system.
10. Describe the functions of suspension and steering control systems and components.
    Examples: active suspension, stability control

Wheel Alignment	11. Perform pre-alignment inspection, measure vehicle ride height, and describe alignment angles (camber, caster and toe).
Wheels and Tires	12. Perform tire inspection and maintenance including identification of tire wear patterns, while interpreting and applying information indicated on the placard and label. 13. Dismount, inspect, and remount tire on wheel to balance wheel and tire assembly, including wheels equipped with tire pressure monitoring system sensors. 14. Inspect tire and wheel assembly for air loss and repair tire following vehicle manufacturer's approved procedure. 15. Identify and calibrate indirect and direct tire pressure monitoring systems (TPMS) and verify operation of instrument panel lamps. a. Demonstrate removal and replacement of sensors in a tire pressure monitoring system (TPMS) including relearn procedure.
General Brakes	16. Describe procedure for performing a road test to check brake system operation, including an anti-lock brake system (ABS). 17. Install wheel and torque lug nuts. 18. Identify brake system components and configuration and describe proper brake pedal height, travel, and feel.
Hydraulic System	19. Check the master cylinder for external leaks and proper operation and inspect brake lines, flexible hoses, and fittings for leaks, dents, kinks, rust, cracks, bulging, wear, and loose fittings or supports. 20. Select, handle, store, and fill brake fluids to proper level using proper fluid type per manufacturer specification.

	21. Identify components of hydraulic brake warning light systems. 22. Bleed and flush brake system, and test brake fluid for contamination.
Drum Brakes	23. Remove, clean, and inspect brake drum; inspect shoes, springs, pins, clips, levers, adjusters and self-adjusters, other related brake hardware and backing support plates; measure brake drum diameter to determine serviceability; and refinish brake drum as needed. 24. Inspect wheel cylinders for leaks and proper operation and remove and replace as needed. 25. Pre-adjust brake shoes and parking brake; install brake drums or drum and hub assemblies and wheel bearings; make final checks and adjustments.
Disc Brakes	26. Perform disc brake maintenance and repair including removing and cleaning caliper assembly, inspecting for leaks and damage to determine needed action, and lubricating slide pins. 27. Remove and replace rotor including cleaning and inspecting rotor and mounting surface of disc brakes and measuring rotor thickness, thickness variation, and lateral runout to determine necessary action. 28. Refinish rotor on and off vehicle, measure final rotor thickness, and compare measurements with specifications. 29. Retract and re-adjust caliper piston on an integral parking brake system. 30. Check brake pad wear indicator to determine necessary action. 31. Explain the importance of operating vehicles to burnish or break in replacement brake pads according to manufacturer's recommendation.

Power-Assist Units	32. Check brake pedal travel with and without engine running to verify proper power booster operation. 33. Identify components of the brake power assist system (vacuum and hydraulic) and check vacuum supply (manifold or auxiliary pump) to vacuum-type power booster.
Related Braking Systems	34. Remove, clean, inspect, repack, and install wheel bearings, replace seals, install hubs and adjust bearings, replace wheel bearing and race as needed. 35. Evaluate parking brake system components for wear, binding, and corrosion; clean, lubricate, adjust and replace as needed. a. Check parking brake operation and parking brake indicator light system operation to determine necessary action. 36. Check operation of brake stop light system. 37. Describe the operation of a regenerative braking system.
Traction Control and Stability Control Systems	38. Identify traction control and vehicle stability control system components.